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Technology Fact Sheet, Adaptation

Trærup, Sara Lærke Meltofte

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Technology Needs Assessments

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Technology Fact Sheet

Adaptation

Follow-up to the First regional capacity building workshop
(Second round countries)
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Port Louis, Mauritius

TNA Team
UNEP Risoe Centre, Denmark
ENDA, Sénégal

Outline

- Introduction to Technology Fact Sheets for Adaptation
- Description and guidance to components of the Technology Fact Sheet for adaptation
- Example: Rainwater Harvesting from Rooftops
- Example: Flood Warning Systems

Introductory remarks

Technology Fact Sheet (TFS): A sheet/document that synthesizes essential information for each priority technology within the context of the country

Target group: experts and non-experts

A template for adaptation technology fact sheet

1. Technology characteristics
2. Costs
3. Development impacts, indirect benefits
4. Local context

Technology: name of technology	
Technology characteristics	
Introduction	Brief introduction to the technology
Technology characteristics/highlights	Few bullet point, i.e. low/high cost, advanced technology, low tech,
Institutional and organizational requirements	How much additional capacity building and knowledge transfer is required for the adaptation option to be implemented
Operation and maintenance	
Endorsement by experts	– in some countries decision-makers will partly base their selection on consistency of proposed adaptation options with international best practices
Adequacy for current climate	– are there negative consequences of the adaptation option in the current climate? Some adaptations may be targeted at the future climate but may have costs and consequences under the current climate
Size of beneficiaries group	– adaptations that provide small benefits to large numbers of people will often be favored over those that provide larger benefits, but to fewer people
Costs	
Cost to implement adaptation options	Cost measures
Additional cost to implement adaptation option, compared to "business as usual"	
Development impacts, indirect benefits	
Economic benefits Employment Investment	 Jobs Capital requirements
Social benefits Income Education Health	 Income generation and distribution Time available for education Number of people with different diseases
Environmental benefits	Reduction in GHG emissions, local pollutants, ecosystem degradation
Local context	
Opportunities and Barriers	– includes barriers to implementation and issues such as the need to adjust other policies to accommodate the adaptation option
Status	Status of technology in the country
Timeframe	Specify timeframe for implementing the technology
Acceptability to local stakeholders	Not all adaptations technologies will be equally attractive to all stakeholders for political, economic, social, or, a cultural reasons

Example: rainwater harvesting

Scenario: extended seasonal droughts

Key issue: water availability decreases

Vulnerability

- falling groundwater levels affect productivity of wells

Impacts

- wells become unproductive, leading to a loss of water supply

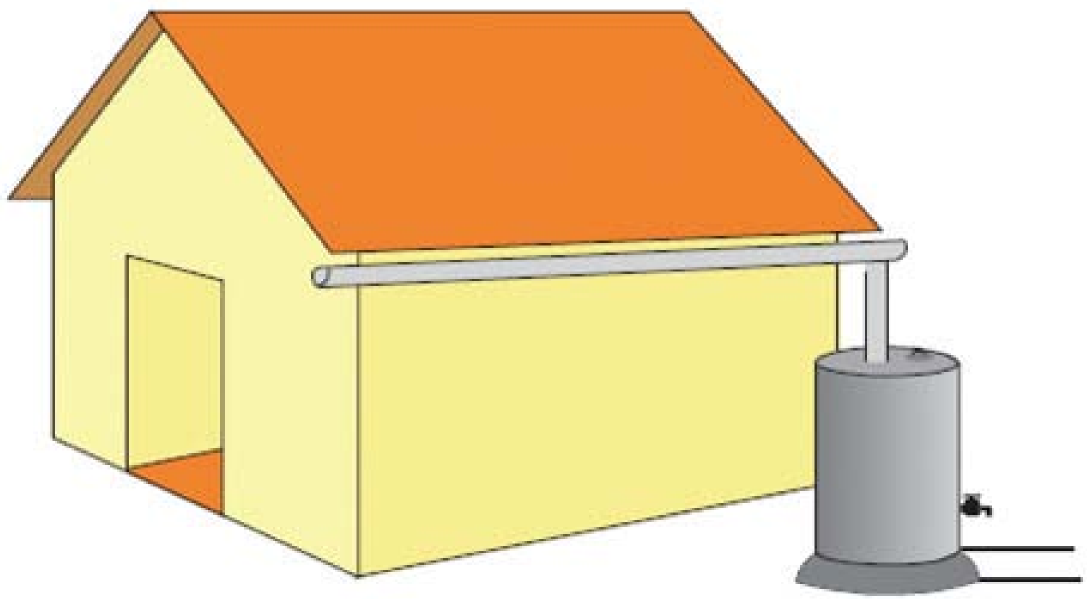
Adaptation technology options, e.g.

- manage groundwater abstraction to maintain drinking water supply
- investigate developing deeper wells
- **promote rooftop rainwater harvesting to enhance groundwater recharge**
- investigate the reuse of wastewater for artificial groundwater recharge
- develop, implement and update water safety plans
- monitor current relationship between groundwater levels and climate
- implement education programme to reduce water demand

  raise awareness among all stakeholders of reuse of wastewater (productive and domestic uses)

Example: rainwater harvesting

Promote rooftop rainwater harvesting to enhance groundwater recharge
(Guidebook for adaptation in the water sector)



Example: rainwater harvesting

Technology: Rainwater Harvesting from Rooftops	
Technology characteristics	
Introduction	RWH is popular as a household option as the water source is close to people, so it is convenient and requires a minimum of energy to collect it. An added advantage is that users own, maintain, and control their system without the need to rely on other members of 'the community' or other stakeholders. – simple construction – Easy accessible technology RWH contributes to climate change adaptation at the household level primarily through two mechanisms: (1) diversification of household water supply; and (2) increased resilience to water quality degradation.

Example: rainwater harvesting

Technology: Rainwater Harvesting from Rooftops	
Technology characteristics	
Institutional and organizational requirements	Basic RWH involves collection, management and use by individual households and there are few if any institutional requirements. However, storage containers usually show strong economies of scale. Therefore, groups of households can often benefit by directing rainfall to one or larger, shared storage containers.
Size of beneficiaries group	Several households may share one medium to large tank. One household may use one small tank.

Example: rainwater harvesting

Technology: Rainwater Harvesting from Rooftops	
Technology characteristics	
Operation and maintenance	simple cleaning and basic repairs training for households, especially related to protecting water quality (e.g. first flush methods, filtration) and budgeting rainwater are likely to lead to improved outcomes.
Disadvantages	One can never be sure how much rain will fall, hence limited supply by the amount of rainfall • Relatively high investment costs (per household) • Importance of maintenance • Water quality is vulnerable to air pollution, animal or bird dropping, insects and organic matter The three latter can be largely overcome by design, ownership and by using as much as possible local material to ensure cost recovery

Example: rainwater harvesting

Capital costs	
Cost to implement adaptation options	If a household already has a suitable hard roof for use as a catchment surface, storage containers are the major expense. The cost of storage containers typically depends on construction quality, tank size, and other factors. A large, high quality storage container can be a major investment for poor households. The storage capacity of the container needs to meet the demand for water during extended dry periods. Cost per unit established = USD 50 Total costs (10 000 units)= USD 400 000
Additional cost to implement adaptation option, compared to "business as usual" (extra storage capacity)	Additional cost per unit = USD 10 Total additional costs = USD 80 000

Example: rainwater harvesting

Development impacts, indirect benefits	
Reduction of vulnerability to climate change, indirect	Reduction in physical damage to property, infrastructure and economic output
Economic benefits	
Employment	Creation of jobs to support construction of RWH systems and to provide training to users/households
Investment	Can create investments in production of storage containers
Public and private expenditures	Reduce public and private expenditures associated with water infrastructure.

Example: rainwater harvesting

Development impacts, indirect benefits	
Social benefits	
Income	It can provide significant savings for households that are sometimes forced to purchase vended or bottled water The water can also contribute to productive and economic livelihood purposes.
Learning	Training elements from capacity building Improved health improves school attendance
Health	Increases per capita water availability. Lack of water can have serious health effects and allow for the spread of disease and illness if the reductions continue for even modest lengths of time. Stored rainwater is a convenient, inexpensive water supply close to the home. This can greatly decrease the time spent fetching water or queuing at water points. In many settings, RWH can reduce exposure to waterborne pathogens by providing improved potable water quality and high quality water for other household purposes including hygiene, bathing and washing.

Example: rainwater harvesting

Development impacts, indirect benefits	
Environmental benefits	Promotion of rainwater harvesting will enhance groundwater recharge

Example: rainwater harvesting

Local context	
Opportunities and Barriers	Barriers to implementation include inadequate or unsuitable (e.g. vegetative) roofing, lack of space for appropriate storage containers, and extreme air pollution. Local supply chains for storage containers and other system components should be in place. Difficult to predict eventual capacity limitations and bad management practices of RWH over a long period.
Market potential	The technology is small-scale, proven and less capital-intensive. It has market potential nationwide.
National status of technology	Present in some areas, lacking in other.
Timeframe	The implementation can start now. Before construction begins, the users are required to prepare the site for construction and collect the sand and gravel required for construction. The construction of a tank is completed during three phases. Each phase of construction lasts approximately two weeks. A carpenter and three assistants provide the technical skills required of the project, while household members/users provide manual labor.
Acceptability to local stakeholders	Easy to accept for all involved stakeholders. However, access to water can be sensitive to national policies and investment priorities.

Example: Rainwater Harvesting from Rooftops, the Fact Sheet

Technology: Rainwater Harvesting from Rooftops	
Technology characteristics	
Introduction	Storage of rainwater can provide short-term security against periods of low rainfall and the failure or degradation of other water supplies. RWH from rooftops into storage containers has been continuously practiced in parts of Africa and Asia for thousands of years. In societies where RWH is a common part of water practices, simple household RWH can be practiced effectively with little training or capacity building. RWH contributes to climate change adaptation at the household level primarily through two mechanisms: (1) diversification of household water supply; and (2) increased resilience to water quality degradation. It can also reduce the pressure on surface and groundwater resources (e.g. the reservoir or aquifer used for piped water supply) by decreasing household demand and has been used as a means to recharge groundwater aquifers. Another possible benefit of rooftop RWH is mitigation of flooding by capturing rooftop runoff during rainstorms. RWH is popular as a household option as the water source is close to people, so it is convenient and requires a minimum of energy to collect it. An added advantage is that users own, maintain, and control their system without the need to rely on other members of 'the community' or other stakeholders. • Low cost • Easy accessible technology
Institutional and organizational requirements	Basic RWH involves collection, management and use by individual households and there are few if any institutional requirements. However, storage containers usually show strong economies of scale. Therefore, groups of households can often benefit by directing rainfall to one or larger, shared storage containers.
Operation and maintenance	Operation and maintenance consists primarily of simple cleaning and basic repairs. However, some training for households, especially related to protecting water quality (e.g. first flush methods, filtration) and budgeting rainwater are likely to lead to improved outcomes.
Endorsement by experts	In the last two decades, interest in rainwater harvesting has grown. Its utilisation is now an option along with more 'traditional' water supply technologies, particularly in rural areas in developing countries.
Adequacy for current climate	Fits well, both for present and expected climate
Size of beneficiaries group	Several households may share one medium to large tank. One household may use one small tank.

Costs	
Cost to implement adaptation options	If a household already has a suitable hard roof for use as a catchment surface, storage containers are the major expense. The cost of storage containers typically depends on construction quality, tank size, and other factors. A large, high quality storage container can be a major investment for poor households. The storage capacity of the container needs to meet the demand for water during extended dry periods. Investment costs show a considerable range by country mainly due to variations in the price of construction materials. Initial cost per capita is relatively high compared to alternatives (if available) but recurrent costs are relatively low. Economies of scale for storage are high, i.e. the larger the tank the lower the price per cubic metre. Cost per unit established = USD 50 Total costs (10 000 units)= USD 400 000
Additional cost to implement adaptation option, compared to "business as usual" (extra storage capacity)	Additional cost per unit = USD 10 Total additional costs = USD 80 000
Development impacts, indirect benefits	
Economic benefits	
Employment	Creation of jobs to support construction of RWH systems and to provide training to users/households
Investment	Can create investments in production of storage containers
Public and private expenditures	Reduce public and private expenditures associated with water infrastructure.
Social benefits	
Income	It can also provide significant savings for households that are sometimes forced to purchase vended or bottled water The water can also contribute to productive and economic livelihood purposes.
Education	Saved time from fetching water can be used for reading and studying. Improved health improves school attendance
Health	Increases per capita water availability. Lack of water can have serious health effects and allow for the spread of disease and illness if the reductions continue for even modest lengths of time. Stored rainwater is a convenient, inexpensive water supply close to the home. This can greatly decrease the time spent fetching water or queuing at water points. In many settings, RWH can reduce exposure to waterborne pathogens by providing improved potable water quality and high quality water for other household purposes including hygiene, bathing and washing.
Environmental benefits	Promotion of rainwater harvesting will enhance groundwater recharge
Local context	
Opportunities and Barriers	Opportunities for investment in RWH are greatest when it can lead to time and cost savings, in addition to improved water quality and health gains. Conditions are most favorable for household RWH when other water sources are: far from the home, of degraded quality, unreliable, or expensive. When "hard" (e.g. metal or tile, in contrast to vegetative) roofing is already in use, capital costs are lower, and efficiency and water quality are superior. Barriers to implementation include inadequate or unsuitable (e.g. vegetative) roofing, lack of space for appropriate storage containers, and extreme air pollution. Local supply chains for storage containers and other system components should be in place. Difficult to predict eventual capacity limitations and bad management practices of RWH over a long period.
Status	Present in some areas, lacking in other.
Timeframe	The implementation can start now. Before construction begins, the users are required to prepare the site for construction and collect the sand and gravel required for construction. The construction of a tank is completed during three phases. Each phase of construction lasts approximately two weeks. A carpenter and three assistants provide the technical skills required of the project, while household members/users provide manual labor.
Acceptability to local stakeholders	Easy to accept for all involved stakeholders. However, access to water can be sensitive to national policies and investment priorities.

Example: Flood warning

Vulnerability

Flooding results in massive loss of life and property.

Impacts

- risk to life
- Evacuation of vulnerable groups to safer locations
- loss of assets (e.g. food, livestock, personal effects)

Adaptation technology options, e.g.

Protect

Accommodate

Flood Warning

Flood forecasting

Flood proofing

Retreat

Example: Flood warning

Technology: Flood Warning System	
Technology characteristics	
Introduction	Detect and forecast threatening flood events so that the public can be alerted in advance and can undertake appropriate responses to minimize the impact of the event. Because of their ability to drastically reduce property losses and loss of life, flood warning services may be seen as a cost-effective means of mitigating flood hazards.
Size of beneficiaries group	Communities in flood prone areas

Example: Flood warning

Technology: Flood Warning System	
Technology characteristics	
Institutional and organizational requirements	A flood warning system is not a standalone response to minimization of the impacts of coastal flooding. An early warning system should be coupled with emergency planning measures, such as the provision of evacuation routes and flood shelters, and should also contain an awareness raising element. Actions can take place on a local level, involving larger organizations, with superior resources, knowledge and know-how may still prove beneficial in improving the quality of warning messages from the warning systems. Better still, by working together with neighboring countries that may also operate flood warning systems, it may be possible to obtain more complete and timely meteorological data, better dissemination of warnings and improved responses.

Example: Flood warning

Technology: Flood Warning System	
Technology characteristics	
Disadvantages	• a flood warning system is not sufficient on its own to reduce risk; people's reactions to warnings – their attitude and the nature of their response – has an important bearing upon the effectiveness of a warning system • system inaccuracies may lead to complacency if previous warnings were unfounded, or fear by causing unnecessary anxiety

Example: Flood warning

Capital costs	
Cost to implement adaptation options	The costs of implementing flood warning systems are expected to differ widely, depending on the level of sophistication of monitoring and forecasting technologies.

Example: Flood warning

Development impacts, indirect benefits	
Reduction of vulnerability to climate change, indirect	Reduction in human casualties Reduction in physical damage to property, infrastructure and economic output
Economic benefits	
Employment	Job creation in monitoring, maintenance etc of the system
Investment	It is not unusual for flood warning schemes in developing countries to be heavily funded by international civil society organizations

Example: Flood warning

Development impacts, indirect benefits	
Social benefits	
Learning	Training elements from capacity building
Health	Reduce loss of life
Income	Reduce property losses
Environmental benefits	
	-

Example: Flood warning

Local context	
Opportunities and Barriers	It is possible to implement flood warning systems together with other adaptation measures, as part of an integrated flood risk management plan. Disbelief of the warnings can be a problem. The approach also requires significant volumes of detailed information to be collected and analysed in order to detect flood threats. It needs significant investment in equipment and training
Market potential	Non-market

Thank you!

Sara Trærup
slmt@risoe.dtu.dk